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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/829,115

04/20/2004

Shyh-Ming Chang

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EXAMINER

PAREKH, NITIN

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 03/18/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

10/829,115

Applicant(s)

CHANG ET AL. 

Examiner

Nitin Parekh

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 20 April 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1, 4-8, 11-16 and 23-29 is/are rejected.
- 7) ☒ Claim(s) 2, 3, 9, 10 and 17-22 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 April 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 2.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date: \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

**DETAILED ACTION**

***Claim Objections***

1. Claims 1, 20 and 29 are objected to as follows:

A. The limitations as recited in line 9, claim 1, include "at least a compliant bump providing a solder point".

However, as described in the specification, the compliant bump do not have a solder point or solder joint/connection.

B. The limitations as recited in claim 20, include "wherein said second protection layer is lower than said compliant bump and said stopper".

It is not clear what attribute (hardness, elasticity, thickness, etc.) is lower with respect to the second protection layer versus the bump and the stopper.

C. The limitations as recited in claim 29, include "wherein said stopper structure is higher than said second protection layer".

It is not clear what attribute (hardness, elasticity, thickness, etc.) is higher with respect to the stopper structure versus the second protection layer.

Appropriate correction is required.

***Claim Rejections - 35 USC § 102***

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

3. Claims 1, 4-8, 11, 13-16 and 23-29 are rejected under 35 U.S.C. 102(b) as being anticipated by Tagusa et al. (US Pat. 4963002).

Regarding claims 1, 4-8, 11, 13, 14, 24-28, Tagusa et al. disclose a bonding structure with compliant bumps (see 56 in Fig. 7), the device comprising:

- a first substrate/device (51 in Fig. 7) acting as a carrier, the first substrate being an integrated circuit (IC) component/chip
- an electrode pad/metal bonding pad (EP/BP-52a in Fig. 7) on the first substrate providing an electrical conduction to the first substrate
- a first protection layer (53 in Fig. 7) on the surface of the first substrate, the first protection layer covering outside of the electrode pad/metal bonding pad and providing insulation and protection (Col. 7, line 4)
- a compliant bump (see 56 in Fig. 7; Col. 7, lines 15-17) comprising a conductive adhesive material providing a conductive channel for the device, the compliant bump having elastic/deformable properties (Col. 7, lines 23-58) and an irregular

shape comprising curved convex/concave surfaces providing reduced/desired contact surface/bonding pressure (see the shape of 56 in Fig. 7 and 8)

- a second substrate made of glass (54 in Fig. 7) having a wiring/conductive electrode (55/55a in Fig. 7; Col. 7, lines 7-10)
- a stopper structure comprising bumps of a metallic material having spherical shape (see 58 in Fig. 7; Col. 7, lines 32-57) for providing a mechanical/electrical contact between the EP/BP and the conductive electrode/wiring of the second substrate, such structure providing the desired gap between the two substrates, controlling the deformation extent of the compliant bump and reducing stress related defects/cracking during bonding to provide stable/reliable connection (Col. 7, lines 32-57)
- the stopper structure being distributed inside of the compliant bump (see Fig. 7)
- an adhesive/non-conductive film/glue (57 in Fig. 7) being bonded between the first substrate/device and the second substrate, and
- the structure being bonded using a conventional thermal compression method (Col. 8, lines 1-42)

(Fig. 7; Col. 6, line 55 - Col. 8, line 42).

Regarding claims 15 and 16, Tasuga et al. teach the entire claimed structure as applied to claim 1 above, wherein Tasuga et al. further teach the stopper structure comprising elastic/deformable material including plastic/polymer (Col. 7, lines 34-58).

Regarding claim 23, Tasuga et al. teach the entire claimed structure as applied to claim 1 above, wherein Tasuga et al. further teach the adhesive film comprising a conductive adhesive film (see 66 in Fig. 10; Col. 9, line 12).

Regarding claim 29, Tasuga et al. teach the entire claimed structure as applied to claim 1 above, wherein Tasuga et al. further teach the stopper structure has a different height than that of the compliant bump (see the bump structure with respect to the stopper 68 in Fig. 10; Col. 9, lines 5-45).

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tagusa et al. (US Pat. 4963002) in view of Pasch (US Pat. 5700715).

Regarding claim 12, Tasuga et al. teach the entire claimed structure as applied to claim 1 above, except the stopper being distributed outside of the compliant bump.

Pasch teach a bonding structure comprising compliant bumps having a stopper structure/pillar bump (see 230 and 240 respectively in Fig. 2a) where the stopper structure/pillar bumps are outside of the compliant bumps to provide the desired support and spacing between two substrates (Col. 6 and 7).

It would have been obvious to a person of ordinary skill in the art at the time invention was made to incorporate the stopper being distributed outside of the compliant bump so that the spacing between two substrates can be controlled and the support can be stabilized in Tasuga et al's bonding structure.

#### ***Allowable Subject Matter***

7. Claims 2, 3, 9, 10 and 17-19, 21 and 22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims and to overcome the objections set forth above.

#### ***Reasons for Allowance***

8. The following is an examiner's statement of reasons for allowance:

The references of record do not teach either singularly or in combination at least the limitations "a metal layer on top of said metal bonding pad and said first protection layer for bonding polymer material and said metal bonding pad; at least a polymer bump

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on said metal layer for providing the main body of said compliant bump; and a conductive layer covering said polymer bump and forming a conductive channel with said metal bonding pad and said metal layer" in a compliant bump structure, or "a metal layer on top of said metal bonding pad and said first protection layer for providing bonding to polymer material; and at least a polymer bump on said metal layer for providing the main body of said compliant bump" in a stopper structure, or "a second protection layer formed by said metal layer and a polymer layer to provide grounding and protecting said first substrate" in a bonded device having compliant bumps and a stopper structure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nitin Parekh whose telephone number is 571-272-1663. The examiner can normally be reached on 09:00AM-05:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9318.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

NP

03-02-05



NITIN PAREKH

PRIMARY EXAMINER

TECHNOLOGY CENTER 2800